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THE BORDER PAPERS

Canada and the U.S.:
A Seamless Energy Border?

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In this issue...

The energy economies of Canada and the United States have become closely integrated. For the past decade energy trade has grown significantly and become more market based, stimulated by deregulation and underwritten by the North American Free Trade Agreement. This has generated substantial benefits for Canada. The growth has taken place with little friction, and energy has not been prominent on the U.S.-Canadian policy agenda. This benign situation is likely to change, with energy issues returning to the headlines.

The Study in Brief

The energy economies of Canada and the United States have become closely integrated. For the past decade energy trade has grown significantly and become more market based, stimulated by deregulation and underwritten by the North American Free Trade Agreement. This has generated substantial benefits for Canada. The growth has taken place with little friction, and energy has not been prominent on the U.S.-Canadian policy agenda.

This benign situation is likely to change, with energy issues returning to the headlines. The price outlook for natural gas and electricity is upward as markets tighten, which will likely lead to calls for reintroduction of government controls. Electricity deregulation in Canada is barely beyond infancy, but further evolution is controversial. One legacy of the September 11 attacks has been to enhance U.S. concerns about security of energy supply. This has led the U.S. to pursue more interventionist policies in energy.

Rapid growth in Canadian oil and gas exports is probably over. It will be more a question of sustaining current levels than of adding appreciably to them. The key to long term oil output rests with Alberta's oil sands. However, implementation of the Kyoto Treaty by Canada could jeopardize access to this bounty. Electricity network development is less advanced than that for oil and gas, and significant gains remain likely to be realized though market integration. Gains will be compromised unless institutions are developed that are capable of effectively co-operating in planning system investment.

A higher profile for energy portends conflicts over further deregulation and trade policy. Canadian governments and regulatory bodies face formidable challenges if the trend to freeing energy markets is to be sustained. In the event of disputes with the United States over trade policy NAFTA provides the fulcrum for resolution, but it remains to be seen whether that treaty is robust enough to protect Canadian interests versus those of the U.S.

More emphasis on energy security by the U.S. provides a platform that could enable Canada to better press its interest in securing favorable access to the U.S. market and in sharing the benefits and costs of further market integration. Energy is one sector where Canada can negotiate from a position of strength.

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After World War II, the energy economies of Canada and the United States became increasingly integrated. That process continues.[1] For the past decade, energy trade has grown significantly, stimulated by deregulation in the 1980s and the United States-Canada Free Trade Agreement (FTA) of 1989, which was, in turn, largely superseded by the North American Free Trade Agreement (NAFTA) in 1994. Energy was prominent in both treaties, warranting separate chapters. Over the 1990s though, energy topics and policies did not loom large on the Canada-U.S. agenda.

However, the energy sector has become more fractious recently. Flawed electricity deregulation in California, the spike in natural-gas prices, implications of the Kyoto Protocol and renewed concern about Middle East oil supplies — to name a few events — have put energy issues back in the headlines.

Energy trade with the United States generates very substantial benefits for Canada. Nevertheless, the distribution of these gains creates conflict. The notion that exports would only be surplus to Canadian needs, defined by a formula, has in substance been abandoned. The Canadian and U.S. oil markets are part of the world oil market; the natural-gas market is North American. Consumers face increased price volatility due to short-term contracting that has accompanied the integration of natural-gas and electricity markets. In electricity, the trend toward standardization of transmission tariffs, uniform access conditions and marginal-cost pricing will compress the room for manoeuvre by Canadian regulators. The extent to which environmental measures are implemented will rebound on oil-sands and coal producers and indirectly on the natural-gas industry.

This *Commentary* surveys energy trade and related developments between the United States and Canada[2] over the past decade or so and discusses some nascent issues of current concern to the two countries.[3] We provide a sketch of the Canadian and U.S. energy sectors, outline the key energy provisions of the NAFTA, then discuss the three most important commodities in bilateral- energy trade: natural gas, oil and electricity. For each, we assess the degree of market integration, institutional features, Canada's strategic position, prospects and policy issues.

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1 The evolution was not smooth. In the 1950s and 1960s, Canada was seeking new markets for burgeoning oil and gas supplies and it looked south. During the 1960s, the U.S. government, in effect, constrained Canadian oil exports; at the same time, Canada continued to favour expanding north-south flows in preference to displacing overseas oil in Quebec and Atlantic Canada. In the 1970s and early 1980s, the Canadian government restricted the flow of oil and gas to the United States at times when it would have been especially welcome. It also forced movement of Canadian oil to Quebec.

2 These two countries are the main NAFTA energy participants, although the agreement led to some relaxation in Mexico's *dirigiste* energy policies.

3 This is not an exhaustive discussion of all energy-related issues. For example, we set aside discussion of the Kyoto Protocol, which is the subject of another *C.D. Howe Institute Commentary* 169 (McKitrick and Wigle 2002). We do not deal with the growing trans-border flows in energy-related investment and services. Nor do we say much about oil refining, the downstream distribution of oil products and natural gas, or coal. Trade in coal between the two countries has not experienced the dynamic changes in oil, gas and electricity and we limit ourselves to a brief mention.

Table 1: ***An Energy Snapshot, Canada and the United States, 2000***

	Canada	United States
Energy demand		
Oil (*thousand barrels per day*)	1,700	19,701
Natural gas (*billion cubic feet*)	3,345	22,547
Coal (*million short tons*)	67	1,081
Electricity (*terawatthours*)	546	3,621
Energy supply		
Oil production (*thousand barrels per day*)	2,749	8,110
Natural gas production (*billion cubic feet*)	5,920	19,403
Coal production (*million short tons*)	76	1,074
Electricity generation (*terawatthours*)	563	3,800
Electricity generation capacity (*gigawatts*)	111	819
Reserves		
Conventional oil (*billion barrels*)	4.4	21.8
Oil sands (*billion barrels*)	176.0	—
Natural gas (*trillion cubic feet*)	92.0	167.0
Coal (*billion short tons*)	9.5	275.6
Population (*million*)	31.8	281.4
Gross domestic product (*billion 1990 US$*)	749	7,980

Source: Adapted from North American Energy Working Group (2002).

In the final two sections of the paper, we appraise some of the conflicts and opportunities inherent in current circumstances and make observations about how events are likely to unfold. A more assertive U.S. administration will challenge Canadian understanding of the significance of continental energy integration. The rapid growth in Canadian oil and gas exports is probably over; indeed, growing strains on capacity foreshadow higher prices, especially for electricity. For Canadian consumers, pressure to continue the thrust toward market-based retail prices will exacerbate these strains. Gains from trade will be harder to realize, though still possible, especially for electricity. However, advances will depend on bilateral cooperation in infrastructure planning and on the ability of Canadian regulators to accommodate energy consumers. The regime that governs energy trade between the United States and Canada is increasingly market based, underwritten by NAFTA. Yet how the NAFTA shoe fits in some energy matters is still untested.

Twenty years ago our *Commentary* would have been replete with recommendations for governments to relax controls on prices, exports and imports and to reform taxes: in short, to move toward reliance on market-based solutions. That has already taken place in large measure. Our recommendation now is for governments to stay the course and resist forces seeking to reinstate command-and-control policies. To succeed, policymakers will have to ensure that potential gains are distributed in a politically acceptable fashion.

Canadian and U.S. Energy Sectors: A Sketch

Table 1 presents salient energy data for Canada and the United States. The much greater magnitude of U.S. energy demand reflects relative economic size, with the U.S. economy about 10 times the size of Canada's. The U.S. consumes more energy than any country in the world.

Energy supply presents a different picture, however. Canada's oil and natural-gas production is about a third of the United States', positioning it as a net exporter of these commodities. Canada also generates proportionately more

electrical energy than the relative size of its economy would suggest and its strength in hydro generation reinforces its export position.

Although the U.S. oil industry is mature, with production gradually declining, the country nevertheless remains the world's third-largest oil producer. It is also the largest producer of natural gas and of coal.

The remaining established reserves of Canadian oil stand in sharp contrast to those of the United States. Canada's conventional oil reserves are relatively modest, but they are dwarfed by Alberta's oil sands, which contain established reserves of 176 billion barrels, although only a relatively small portion of them are in production. The ratio of remaining conventional oil reserves to current annual production is about nine years, a similar figure to that for the United States. With the inclusion of oil sands, that ratio becomes 80 years. However, access to the oil-sands reserves depends on a series of large, lumpy investments, with a lead time of three years. Canada's natural-gas reserves are produced at much the same rate as those in the United States.

Energy Trade

Canada is the United States' largest foreign supplier of crude oil, natural gas and electricity; about 60 percent of Canada's oil production is exported, almost all of it to the U.S.

Painted with a broad brush, the picture of cross-border trade is of Canada as an exporter and the United States as an importer. But the relationship is more complex than that. Canada is the United States' largest overall energy-trading partner — its leading foreign supplier of crude oil, natural gas and electricity. About 60 percent of Canada's oil production is exported, almost all to the United States. At the same time, Canada imports oil, mostly from North Sea sources, to satisfy more than half of its own refinery feedstock requirements. For natural gas, net exports account for more than half of Canadian production; all exports are to the United States.

The United States is a major and growing net importer of energy. Most U.S. energy imports relate to oil and gas. About half of U.S. oil consumption is supplied by imports, with Canada providing about 15 percent and Mexico 10 percent of total import volumes in 2001. Imports also satisfy about 15 percent of U.S. natural-gas consumption, almost all coming from Canada.

Trade in electricity, while of far less dollar importance than oil or gas, is of growing significance. In 2000, Canada's net exports of electricity as a proportion of its production were slightly more than 7 percent, a figure relatively unchanged since 1980. This represented only about 1 percent of total U.S. demand. These figures fail to reflect the actual interdependence that exists because of the nature of trade in electricity. With the development of freer markets in the United States, the importance of short-term trading, which depends on the ability to supply power at times of peak system load, has vastly increased. Canada's strong position in hydro generation creates lucrative opportunities to exploit price variation with a sell-high, buy-low strategy.

Coal is abundant in North America; such trade as exists between Canada and the U.S. is determined by the proximity of deposits to markets. Eastern Canadian users — electricity and steel producers — import thermal coal from Appalachian mines, while western Canadian mines export metallurgical coal to steelmakers in Japan, Korea and China. Trade in coal is less significant than trade in the other

energy commodities. More importantly, coal trade between Canada and the United States has never been subject to the regulatory constraints that have periodically impinged on trade in crude oil, natural gas and electricity. As a result, the free play of markets has mainly determined trade patterns.

Deregulation

During the 1980s, both Canada and the United States dismantled the labyrinth of price and other controls that had both cosseted and buffeted the oil and gas industries in the 1970s. The United States abruptly deregulated oil prices in 1981. Oil deregulation was equally brusque in Canada, where the Western Accord of 1985 freed up oil pricing and eliminated various federal taxes and grants. In that same year, U.S. regulations were amended to allow the direct export to Canada of crude oil from the lower 48 (all the states except Alaska and Hawaii).[4]

Deregulation of natural gas was more protracted. In Canada, the so-called Halloween Agreement of October 1985 was intended to foster a competitive market; implementation took several years, as federal and provincial statutes were amended, legacies of contractual practices from the regulated era unravelled and pipeline merchant and transportation functions were unbundled to allow more open pipeline access. The process in the United States was similar, tracked by a plethora of Federal Energy Regulation Commission (FERC) orders and court decisions, although phased price-decontrol had been ushered in as long before as 1978.

Deregulation started later for electricity than for fossil fuels, and murky jurisdictional boundaries in both countries complicated the process. The development of financial markets dealing with forward, futures and derivative transactions that enable more efficient market operation accompanied deregulation, as happened earlier for oil and natural gas.

These initiatives all preceded the 1989 bilateral FTA between Canada and the United States and its successor, the 1994 trilateral agreement among Canada, Mexico and the United States, the NAFTA, our next topic.

Energy in the NAFTA

The NAFTA is intended to provide a long-term framework governing trade among the United States, Canada and Mexico. We focus here on the United States and Canada. Chapter 6 of NAFTA, dealing with energy, largely applies only to these two countries because Mexico took several reservations that greatly limit the extent of its commitments.[5]

Although the agreement encourages open trade, it by no means erases the border between the United States and Canada. All terms of the FTA were reflected

4 Previously, exchanges of crude oil had been permissible.

5 Chapter 6 concerns energy and basic petrochemicals, including associated services and investments. Some reservations, however, relate specifically to trade in energy services. Mexico has largely opted out of the NAFTA energy arrangements, reflecting the position petroleum resources occupy in that country's constitution (see article 601.1).

in the NAFTA. In the event of any inconsistency between its provisions and other agreements, the NAFTA prevails unless otherwise noted in the treaty.[6]

The energy provisions of NAFTA cover trade and related activities in oil, natural gas, electricity, coal and basic petrochemicals. Broad commitments have been made to limit government interference in energy trade unless justified in circumstances specified in the agreement. The usual measures that governments take to intervene in energy markets, such as discriminatory export prices and taxes, are prohibited. The grounds for intervention are confined to national security, relief of supply shortages, domestic price stabilization and resource conservation. If a government imposes supply restrictions, the NAFTA's *proportionality provisions* (provisions for maintaining the share of exports in total supply) come into play. Their intent is to ensure a degree of access on commercial terms by consumers in one country if the other imposes restrictions.[7]

Former concerns in the United States and Canada about national security and shielding industries and consumers from market forces have receded. And the NAFTA includes a pointed reference to adherence by sub-federal agencies, indicating that the accord is intended to be pervasive, reaching all levels. (Our Appendix A discusses the energy provisions of the NAFTA in more detail.)

To date, no action has animated the NAFTA's energy-dispute mechanisms or entailed interpretation. Canada amended the *National Energy Board Act* to give effect to the agreement (NEBA, sec 120); the U.S. preferred to rely on administrative guidelines for its affected agencies.

The Principal Traded Sources of Energy

We now turn to trade-related developments and prospects for the three main sources of traded energy supply in Canada: natural gas, oil and electricity. For each, first we present data on the balance of trans-border trade and the spread between export and import values.[8] We next look at the institutional conditions within which trade has developed. There, we consider the significance to Canada of energy trade and, conversely, to the United States, which establishes Canada's strategic position. In this context, we then point out some emerging issues and policy dimensions.

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6 Annex 608.2 (2) of the NAFTA provides that in the event of any inconsistency between it and the agreement on an International Energy Program (IEP) relating to oil-supply emergencies, the IEP shall prevail. (Later, we mention the IEP in more detail.) Any outstanding obligations between Canada and the U.S. in the FTA not covered by the NAFTA remain.

7 These arrangements apply to trade between Canada and the United States, not Mexico.

8 This spread is not a comprehensive measure of trade advantages: trade benefits importers and exporters alike. And we do not attempt to assess the economic gains that accrue when trade magnifies the benefits of factor endowments. There are also efficiency gains from economies of scale associated with moving larger volumes than domestic markets would dictate.

Natural Gas

Trans-Border Flows

Table B-1 in Appendix B presents the trans-border flows of natural gas. The expansion in exports of Canadian natural gas to the United States over the past decade has been nothing short of spectacular, more than doubling. The increase reflects the influence of deregulation in both countries as well as the provision of additional pipeline capacity. Production has also benefited from absorbing latent spare capacity that accrued during the era of quantitative controls. Much of the rise in total Canadian gas production — more than 60 percent between 1991 and 2001 — went to the export market.

Canada's export volumes dwarfed imports, but the latter were not trivial and grew appreciably between 2000 and 2001, with much more gas moving to Ontario via a U.S. routing. Although labelled an import, much of it constituted *re*-import of exported Canadian gas. This development makes a look at net exports important. Gross gas exports rose by as much as 9 percent in 2001, net exports by 5 percent (DNR 2002).

Average border prices of natural gas tended to increase during the 1990s; especially sharp rises occurred in 2000 and 2001, with prices in 2001 double those in 1999 (see Table B-1). In 2002, however, prices reverted to levels more akin to 1999 as markets adjusted. Expressed in Canadian dollars, natural-gas prices have also benefited from the decline in the exchange value of the Canadian dollar because export prices are denominated in U.S. currency.

Institutional Factors

The institutional factors we consider here are licensing, access to local supply and pipelines. All three have important implications.

Licensing

Under the NEBA (part VI, 116), Canadian exports and imports of natural gas and electricity require a licence, order or permit. Licenses apply to longer-term exports, orders to the short-term; permits apply to electricity. Exports of oil also require a licence or order (although imports of oil do not). Because of these policy similarities, this subsection refers to all three commodities. Authorization requires that the quantity exported be surplus to Canada's requirements. The legislative language is:

> [t]he quantity of oil and gas to be exported does not exceed the surplus remaining after due allowance has been made for the reasonably foreseeable requirements for use in Canada having regard to the trends in the discovery of oil or gas in Canada... (NEBA, part VI, sec 118a.)

Interpretation of this mandate has changed markedly over time. Before deregulation in 1986, protection took the form of arithmetic tests designed to show that reserves were surplus after deduction of expected long-term Canadian demand and outstanding export commitments. This procedure applied especially to natural gas, for which long-term supply contracts were prevalent. Deregulation spawned a different mechanism, with the introduction of market-based procedures (MPBs), mainly predicated on access conditions for domestic buyers.

We observe with curiosity the way the legislation quoted above, written in 1959, has been retained notwithstanding the sharp change in regulatory regime. The language was clearly designed for the era of the distinctively arithmetic test of surplus, not for the very different circumstances of market-dictated adjustments. It appears to be a case of benign legislative lassitude, one reflecting a hope that the regulations would be sufficiently elastic to embrace different designs.

Local Supply Access

The MBP is intended to assure Canadian customers proper access to supply, though not on terms and conditions which are tantamount to special treatment. Application of the policy seemingly varies slightly among natural gas, oil and electricity. In 1987, a *complaints procedure* (CP) was adopted for natural gas; electricity and oil use a *fair market access* (FMA) procedure. Differences in language apart, all are of the same ilk. Domestic buyers have rights to intervene by, in effect, bidding on quantities proposed for export. What is not clearly spelled out in the MBP is whether domestic buyers enjoy pre-emptive bidding rights. It would seem not. The MBP preceded the NAFTA (and the FTA) but is consistent with it.

Long-term gas export licences oblige an exporter to ensure that potential Canadian buyers have been informed and offered access on the same basis as export customers.

Application of the policy differs between long-term licences (those for longer than two years) and short-term orders (those for two years or less). Long-term licences to export natural gas oblige the putative licensee to ensure that potential Canadian buyers of the gas in question have been informed of the proposed export and offered access on the same terms as export customers. If no Canadian buyer evinces interest in buying some or all of the gas on conditions similar to those governing the export deal, normally the licence will be granted.[9]

The other arm of the NEB's natural-gas licensing requirements is the issuance of orders for exports or imports for two years or less. These have no restriction on volume, point of export or price, entail no public hearing and do not require satisfaction of the CP. The argument for insulating short-term orders from the complaints procedure seems to be simply that the ability to acquire supply for export is, in and of itself, sufficient demonstration of surplus. Renewal of any short-term order must confront the prevailing supply-demand nexus.

Thus, the CP is the way the NEB currently fulfils its mandate for exporting only gas surplus to Canada's needs, a mandate it relinquishes for short-term orders in any formal sense other than that of a simple market test of supply availability.

Many long-term natural-gas export licences were issued after 1959; about 80 of them are still valid. However, currently most Canadian gas exports are under

9 All applications for long-term licences require a public hearing.

short-term orders: 80 percent in 2001, up from 73 percent in the previous year, reflecting increased volumes moving on the Alliance Pipeline LP line and the Maritimes and Northeast Pipeline Management (M&NP) systems (see NEB 2002a, 19). Notwithstanding the surplus of already awarded long-term licences, most exports are taking place under short-term orders, a regime cushioning them from any potential action under the CP.

Thus far, no one has formally brought before the NEB a case of eager domestic buyers frustrated by sellers' preferring exports, even though domestic offers were not inferior to export purchase. However, emerging tighter markets make it more likely that bidding conflicts will surface, possibly requiring NEB intervention. Perhaps a harbinger of things to come is the recent initiative taken by New Brunswick before the (discussed later).

Provincial governments issue natural-gas removal permits for trans-border, as well as inter-provincial, movements. The criteria, at least in Alberta, have more in common with the NEB's previous surplus arithmetic than its current market-based procedure. Although provincial legislation has not been amended to parallel changes in NEB legislation, provincial agencies are still subject to the NAFTA in implementing removal policies. (This aspect is discussed further below.)

Pipelines

Natural gas from fields in western Canada (mainly Alberta) has been traditionally transported in four major trans-border pipeline systems. Duke Energy (formerly Westcoast Energy) travels from northeast British Columbia to the U.S. border; TransCanada PipeLines (TCPL) runs east from Alberta, serving eastern Canadian markets and the U.S.; TCPL also travels southwest from Alberta to California, linking with Pacific Gas Transmission (PGT), and the Alberta Foothills Prebuild links with the Northern Border system in the U.S.

Recently, the natural-gas pipeline industry has undergone some significant changes, making it more competitive. The Alliance system began operations in December 2000, delivering gas from B.C. and Alberta to the Chicago area; it connects with the new Vector system that runs from Chicago to storage fields located near Sarnia, Ontario. These pipelines furnish an alternative to the TCPL system for delivering western Canadian gas to central Canadian markets and to the United States. Currently, the combination of TCPL and Alliance provides Alberta with excess take-away capacity, contrary to the previous predicament of gas stranded in Alberta, depressing prices there. The Vector system is being used to deliver Canadian gas to Ontario.

The M&NP system is now moving Scotia shelf gas to New Brunswick, Nova Scotia and markets on the U.S. east coast. And BC Gas Utility Ltd. began operating the southern crossing pipeline, offering an alternative way for Alberta gas to reach B.C.'s lower mainland and, potentially, Pacific Northwest export markets.

In summary, recent pipeline construction has greatly broadened market scope, thus facilitating further market integration.

Trade Balances

In combination, higher natural-gas prices and increases in export volumes tripled the net positive balance to Canada's natural-gas trade with the U.S. over the decade of the 1990s (Table B-1). In 2001, export volumes were more than double 1991 levels. The very high gas prices of the previous two years boosted the trade balance to $25 billion in 2001, compared with $3.3 billion in 1991. But with lower prices in 2002, the balance declined markedly. The net value of Canada's trade balance in natural gas is currently approaching double that for oil.[10]

Canada's Strategic Position

Canada currently meets 15 percent of U.S. demand for natural gas, a sizable chunk. And this number masks higher degrees of regional dependence. For example, Canada supplies 30 percent of Californian demand. The significant role Canada plays in meeting U.S. demand confers influence if it comes to interpreting NAFTA legislation. It also strengthens Canada's negotiating position in disputes that may arise about the routing of a pipeline to bring Alaskan gas to the lower 48 states — any such line would traverse Canadian territory.

Canadian natural gas is traded in a North American context, with the U.S. market predominant. Offshore natural-gas markets, while growing, remain relatively small: at present there is no world natural-gas market analogous to the one for oil.

In North America, pipeline interconnections swiftly transmit market pressures; there are well- recognized and linked pricing hubs — for example Henry Hub in Louisiana and the Alberta Energy Company-Nova Inventory Transfer (AECO-C/NIT) point near Empress, Alberta. However, the interconnections are not yet strong enough to make the system equivalent to a large reservoir, with pressure equalization quickly prevailing. Transportation bottlenecks can intervene. Witness what happened in 2001, when large regional price differentials emerged. California, the Pacific Northwest and British Columbia recorded very high natural-gas prices, partly as a consequence of reduced hydroelectricity production after low rainfall in California, resulting in a need for more power generation from gas-fired facilities. These circumstances drove gas demand above pipeline capacity in the area, pushing prices through the roof in the U.S. west coast states and reverberating in British Columbia to the chagrin of consumers there. Yet at much the same time in the U.S. Rockies, gas production capacity exceeded pipeline capacity, keeping prices there subdued (DNR 2002, v).

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10 A broader perspective on trade is given by the ratio of imports plus exports to the relevant levels of total activity. In Canada, the index of the ratio of Canada's natural-gas trade (exports to the United States plus imports from the United States) to total natural-gas demand in the country was 177 in 2000 (1991 = 100). In the United States, the corresponding index of the ratio of Canadian natural-gas trade (exports to Canada plus imports from Canada) to U.S. natural-gas demand was 170 in 2000 (1991 = 100). These figures illustrate how deregulation, underpinned by treaty obligations, has stimulated bilateral trade.

Prospects and Policies

The Canadian natural-gas industry is entering a new phase. Strong increases in total production and especially in export flows have been recorded. The rise in the share of the U.S. market that Canada satisfies (from about 10 percent in 1991 to 15 percent currently) took place at a time when the overall U.S. market itself showed noticeable growth.

However, the trend of increased penetration is likely at an end. To be sure, Canadian gas may reach new regions in the United States — for example, markets served by Scotia shelf gas. But in aggregate, the scope for Canada to further increase deliveries to the U.S. market is more constrained than it was in previous decades. Indeed, absent significant new sources, it may be more a question of maintaining current delivery levels than one of significant augmentation.

Western Canada Supply Outlook

The scope for Canada to further increase deliveries to the U.S. market is more constrained than in previous decades.

Production from the Western Canada sedimentary basin (WCSB) seems to have approached a plateau, at least in Alberta. The Alberta Energy and Utilities Board (AEUB) expects only slight increases in the productive capability of Alberta conventional natural gas over the next few years before a decline sets in.[11] Coal-bed methane (CBM) is viewed as a possible supplement to conventional supply over the next decade (AEUB 2002, 4–15). The NEB, in its last energy supply-demand review (NEB 1999, 48–49), also sees conventional WCSB production set to fall about a decade from now, but it believes that any reduction will be more than offset by production from new sources including the Scotia shelf, CBM, tight gas and frontier gas.[12] (As an aside, we caution that projections of impending declines in supplies of conventional natural gas — and oil — are all too often confounded.)

Not surprisingly, more stringent supply outlooks are expected to generate steadily rising prices beyond 2005 or so (NEB 1999, 50).[13] And quite apart from a renewed interest by the United States in bringing Alaskan gas to market, producer groups have been looking again at the feasibility of a major pipeline from the Mackenzie Delta. Exploration activity in related areas has remained notable and more exploration licences have been issued for the Beaufort Sea. Momentum behind the Mackenzie pipeline project is growing, irrespective of what happens to the Alaska pipeline project routing discussed later.[14]

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11 Alberta accounts for about 80 percent of Canadian gas production (NEB 2002a, 17).

12 At the time of writing, publication of a new assessment by the NEB was imminent. Tight gas means natural gas contained in low-permeability reservoirs. Encana, Canada's largest oil and gas company, claims to have commenced commercial production of CBM in southern Alberta. The Alberta seams, however, are typically leaner and more scattered than those in the U.S.

13 Market pressures may also be aggravated by potential Mexican demand growth.

14 See "Mackenzie delta declared winner of pipeline race," *Globe and Mail*, March 7, 2003, p. B3.

Alberta Meets the NAFTA?

Alberta's legislation requires licences to remove natural gas from the province. No distinction is made between gas destined for export or for domestic markets. Removal is permitted only if the gas is surplus to the estimated needs of Alberta core consumers,[15] calculated as a multiple of 15 times their current demand. Unlike the NEB's current test, this one is arithmetic. But like the NEB, the AEUB issues short- and long-term permits. Short-term permits do not require specification of reserves and markets. Handling such applications is routine and requires no advertising for objection. Long-term permit applications may go to a hearing; markets and reserves need to be cited. In the event of shortages resulting from disruptions, Alberta legislation provides for diversion of gas licensed for removal.

Alberta gas demand is expected to continue to rise — stimulated especially by the large volumes of gas required for oil-sands activity — unless it is thwarted by implementation of the Kyoto Protocol (see AEUB 2002, 4–17).[16] Should conventional supply in Alberta start to dwindle without offset by development of coal-bed methane or tight gas, the province's removal-permit restrictions could bite, although currently there is a healthy wedge between the amount serving local markets (including core consumers) and authorized long-term gas removals.

If Alberta's needs did begin to press on removals, short-term permits would be the first to be relinquished. The short-term market provides a ready avenue for domestic users to bid for supply. But what if price spikes and local shortages provoked diversion of supply covered by long-term licences, including those destined for export markets? Here the United States might invoke the proportionality provisions of the NAFTA. How this situation might be handled is obscure. The NAFTA abjures lower-tier regulators not to frustrate the agreement's provisions. This would not let the federal government off the hook because the provincial fiat does not override the proportionality clauses. Such potential conflict between tiers of government is an unresolved NAFTA issue.

Canada First?

A recent application by New Brunswick to the NEB concerned local consumers' access to Scotia shelf gas moving to export markets. Most of these exports take place under short-term orders. Recall that such orders are not subject to the NEB complaints procedure that allows local consumers potential access to proposed long-term exports by offering terms and conditions equivalent to the export buyers.' Under present practice, then, local buyers are precluded from exercising the rights of access that would apply were the gas intended for export under longer-term licences. In effect, New Brunswick requested that access conditions applying to long-term licences also apply to short-term orders.

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15 *Core consumers* are Alberta's residential, commercial and industrial gas consumers without access to alternative sustainable fuel sources.

16 Substantial amounts of natural gas are used as a fuel source in both integrated mining projects and for in-situ undertakings (see NEB 2000, ix).

There have been suggestions that the New Brunswick position was tantamount to a request to reserve gas for local markets by ensuring their needs were met before any negotiations for export purchasers were concluded. If that occurred, the situation would be redolent of earlier protective policies. Reservation of gas supply would excite NAFTA concerns, unless justified under the supply-shortage criterion. But that would not be the end of the story: export customers might seek to invoke the NAFTA proportionality provisions to maintain access to Scotia shelf gas. And any reservation system — if one emerged — could introduce price differentials between the domestic and the export market, contravening the sense of the NAFTA.

The NEB denied New Brunswick's application on grounds that it would interfere with normal market operations, would do little to assist Canadian buyers requiring long-term gas supply and would adversely affect the supply investment climate (NEB 2002b). The market was not seen as dysfunctional. But in the case of new developments such as Scotia shelf gas, the NEB did see that access conditions could pose difficulties not experienced in a mature market. To meet this concern, the NEB has introduced a more finely tuned monitoring system.

Alaskan Natural Gas

Some U.S. initiatives have evoked outright opposition; Ottawa says a decision on a pipeline route should be determined by markets, not governments.

Plans to build a pipeline to carry Alaskan north slope gas through Canada to markets in the lower 48 states, mooted in the 1970s, have been resuscitated. The report of a task force chaired by Vice-President Richard Cheney included a recommendation that the U.S. government work closely with Canada and Alaska to expedite its construction (Cheney Report 2001, 7–11).

Bills are currently before Congress could provide federal loan guarantees of up to $10 billion for a pipeline. The rub? The line must take a route that would parallel the Alaska oil pipeline as far as Fairbanks, Alaska, and then proceed along the Alaska Highway to northern British Columbia. From there, it would link, at Caroline, Alberta, with the Foothills Prebuild pipeline for delivery to the United States, or possibly move directly south from the Alaska Highway via a bullet line to Chicago.[17] The prospective routing is also influenced by the state of Alaska's refusal to allow export unless the local economy benefits from gas use.[18]

This routing may well be more expensive than the shorter northern route that would see the line go from Prudhoe Bay east across the Beaufort Sea to the Mackenzie delta and then south along the Mackenzie Valley. Furthermore, pending U.S. legislative amendments envisage Alaskan producers' enjoying a natural-gas price band with a floor of $3.25 per thousand cubic feet (mcf) courtesy of the U.S. Treasury, recouped if prices exceeded $4.875/mcf.[19] Other measures have also been mooted.[20]

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17 The Foothills line would probably need expansion.

18 Alaska owns the gas reserves on the North Slope.

19 Canada is no stranger to this kind of arrangements. For example, floor prices were negotiated for the Syncrude oil-sands project and for the Hibernia field off Newfoundland, with payback arrangements when prices exceeded certain levels.

20 They include accelerated depreciation, tax credits for a gas treatment plant and countercyclical wellhead production credits.

Not surprisingly, these initiatives have excited some concerns and outright opposition. They have been seen as market distorting. Ottawa has said that the decision on the route should be made without intrusion by government: let economics decide.[21] In the 1970s, the northern route had been the frontrunner until torpedoed by the report of the Berger Inquiry (1977), which recommended a moratorium on pipeline construction traversing Indian lands in Canada. This time, First Nations peoples generally support a routing through their territories and the northern route is back on the table, at least for the Canadian government. However, it would still have to run the gamut of several levels of governments in the Mackenzie Delta and some native settlements still have to be concluded.

Would adopting the U.S. proposals contravene the NAFTA, thereby offering a possible avenue of redress for Canada? Certainly, a government awarding minimum price levels to a region and bestowing special favours on one route over another where both traverse the territory of another NAFTA party appear contrary to the spirit of the agreement.

Would the measures violate the letter of the agreement as well? Opponents could point to the no-minimum-price provision for traded energy and to the admonition for regulators to avoid disrupting contractual relationships. Proponents could argue that a price floor would be solely a U.S. domestic matter — the gas might traverse Canada but would not be traded. Moreover, the provisions could be seen as needed to develop supply and maintain a reserve base. One certainty is that any dispute would provide fertile ground for agile lawyers. Irrespective, we see the position of the Canadian government as having some merit: the U.S. proposals would undermine market mechanisms enshrined in the NAFTA, although a hands-off, let-the-market-decide notion is perhaps too facile for such a high-risk expensive project.

Crude Oil

Trans-Border Flows

Table B-2 in Appendix B traces trans-border flows of crude oil between Canada and the United States between 1991 and 2001.[22] The flows were mainly in one direction — from Canada to the United States — and they increased by some 80 percent during those years. This expansion had more to do with a change in the configuration of supply patterns than with increases in Canadian oil production. That production, virtually at capacity throughout the period, rose by 17 percent over the decade. New pipelines, pipeline expansions, and the 1999 reversal of the pipeline linking Sarnia and Montreal (Enbridge Line 9) illustrate the north-south pull exerted by trans-border deregulation under the NAFTA umbrella.

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21 See comments by Natural Resources Minister Herb Dhalliwal, reported in "Ottawa, U.S. clash over subsidies for gas pipeline," *National Post*, September 11, 2002, p. FP6. See also "Subsidies fight over pipeline heats up again," *National Post*, February 14, 2003, p. FP6.

22 The data *exclude* flows of refined petroleum products.

Substantial shipments of oil from offshore Newfoundland began in 1997; their destination varied, but a 50:50 split between export markets and Atlantic Canada plus Quebec would be representative.[23] Imports of crude oil from the United States to Canada were minor, though they became more significant during the late 1990s, with movements from the U.S. Gulf to Ontario. But these flows have languished since the reversal of the Sarnia-Montreal pipeline.

Table B-2 also sets out average border prices in Canadian dollars. These, of course, reflect fluctuations not only in the Canadian-U.S. exchange rate but also in world oil prices, which have been marked over the past few years. But during the early 1990s prices were quite stable at C$20- to-C$22 per barrel.[24]

Institutional Factors

Licensing

We have already described the need for export licences to satisfy the NEB's surplus criterion, as well as the marked change in the manner of the test after deregulation in the mid-1980s, when a market-based procedure (MPB) was adopted.

Recall from the preceding discussion that the MBP provides an opportunity for buyers serving the Canadian market to purchase oil on terms and conditions similar to those of proposed export sales. The fair market access (FMA) policy for oil was promulgated in 1996, several years after a similar policy was prescribed for natural gas (see NEB 1997). As for natural gas, the procedure applies to the award of long-term licences and orders, not short-term orders, with *long term* defined as more than one year in the case of light oil, two years for heavy oil.

Historically, the export of oil has taken place under short-term contracts and that remains the case today. In contrast with the situation for natural gas, no long-term licences for crude oil have been issued after the original federal surplus legislation came into effect in 1959. Thus, at present, *all* Canadian oil exports take place under the vehicle of short-term non-restrictive orders, and, in the absence of applications for long-term licences, the FMA procedure is untested (NEB 2000, 70).

Pipelines

The main trunkline moving oil from western Canada to the U.S. is Enbridge Pipelines, serving major refineries in Ontario and the U.S. Great Lakes area through the Lakehead system. This region is the largest market for Canadian oil. The Lakehead system is linked to various U.S. carriers and affords Canadian oil access to other markets in the United States.

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23 Newfoundland oil has also been run in Ontario refineries.

24 Average prices mask a range bracketed by higher prices for light crude oils and lower prices for heavy oil and bitumen.

Throughout the 1990s Enbridge's installed capacity did not keep pace with the substantial increases in oil productive capability. Three expansions were proposed; all of them were completed by 2002.

Trans Mountain Pipeline ships Canadian oil west to Vancouver, providing access to the U.S. Pacific northwest, California, and overseas. Capacity was not expanded in the 1990s. New capacity might be required if Transmountain were to handle additional oil-sands output.

The Express pipeline, which began operation in 1997, moves Canadian crude south from Alberta to the Rocky Mountain states. Capacity increases are mooted. Express also owns a pipeline (Platte) in the United States that further extends the marketing orbit for Canadian oil.[25]

Trade Balances

Changes in pipeline capacity and configuration and the building of the new Express pipeline have resulted in a substantial net gain for Canada's trans-border trade in oil. The difference between the values of exports to and imports from the U.S. almost tripled over the 1991-to-2001 period, amounting at present to more than C$15 billion annually (see Table B-2).[26] Denomination of oil prices in U.S. dollars has also boosted nominal export and import values in Canada, given the Canadian currency's depreciation in the latter half of the 1990s.

Canada's position as an overland oil supplier to the U.S. enabled it to enjoy some latitude under a restrictive United States' program from 1957-to-1971.

In large measure, the shift in the marketing orbit for Canadian oil further east with construction of the Sarnia-Montreal pipeline in 1975 was an economic distortion. Restoration of a more economic pattern, with overseas oil serving Montreal and the reversal of the Sarnia-Montreal pipeline allowing offshore crude oil — including some from Newfoundland — to enter Ontario has contributed to trade gains.[27]

Canada's Strategic Position

Historically, Canada's position as an overland supplier of oil to the United States enabled it to enjoy some latitude under the U.S. program restricting oil imports that prevailed from 1957 until 1971. During this period, Canada's access to the U.S. market was by no means totally free; subtle restraints operated. Nevertheless, under the "overland exemption," Canada and Mexico enjoyed much better access than other nations, much to the chagrin of Venezuela, which considered itself part

25 However, the Platte system is old and expanding it would not be easy. For information on Canadian oil pipeline developments, see NEB (2000, pp. 62–65).

26 Note that a significant proportion of the gain *vis-à-vis* the U.S. is offset by more imports of foreign oil to eastern Canada, given reversal of the Montreal-Sarnia pipeline in 1999.

27 As for natural gas, a broader perspective on trade can be provided by calculating the ratio of imports plus exports to relevant levels of total activity. The crude-oil trade index (exports to the United States plus imports from the United States, relative to Canadian oil demand) in 2000 was 162 (1991 = 100). For the United States, the parallel index (exports to Canada plus imports from Canada, relative to U.S. oil demand) was 140 in 2000 (1991 = 100).

of a western hemisphere oil-supply security bloc.[28] Now, Canadian crude oil is essentially sold and purchased at prices that are governed by the world market, of which Canada's share is quite small.

The Cheney Report, which laid out a framework for U.S. energy policy, expressed concern about the vulnerability of the United States to disruptions in international oil supply. It was especially aware of the potential role of the oil sands as a secure and growing source, seeing their development as a "pillar of sustained North American energy and economic security" (2001, 8-8). Indeed, some sectors of public opinion in the United States do not even view Canada as a foreign supplier (see Hyndman and Stringham 2002). Those holding such opinions are probably not aware that Canada imports more than half of its refinery feedstocks from overseas. Note that the Montreal-Sarnia pipeline could be reversed again to carry Canadian oil to Montreal.

Responses to supply disruptions are governed by the International Energy Program (IEP), signed in 1974. The IEP provides for the 26 member countries to cooperate in meeting oil supply shortages. If oil supplies to the group fall by 7 percent or more, IEA countries are committed to reduce demand, draw down stocks, and share available oil. The program distinguishes among members with supply obligations and those with supply rights. Currently, in most circumstances under which the program would be activated, Canada as a net exporter would have supply obligations; the United States as a net importer would have supply rights. The sharing arrangements are multilateral, not bilateral. To date, the IEP has never been invoked, since the 7-percent criterion has never been breached.[29]

A higher place for energy security on the U.S.-Canada agenda provides a chance for Canada to better press its interests.

The September 11, 2001, attacks on the United States added energy infrastructure to that country's security list and provided an extra incentive for it to ensure that the Strategic Petroleum Reserve (SPR) is full to the brim. The attacks altered the geopolitics of world oil. Russia assumed a potentially more important strategic role; supplies from the Middle East became viewed as more vulnerable. Further discussion of these issues lies beyond the scope of this paper. Suffice it to say that a higher place for energy security on the U.S.-Canada agenda provides an opportunity for Canada to better press its interests.

Prospects and Policies

Conventional oil production from western Canada is slowly and seemingly inexorably set to decline. But current prognostications see this trend as more than offset by substantial increases in Alberta's oil-sands output and by new east coast supplies (such as those from offshore Newfoundland). The NEB foresees total Canadian oil production rising to more than 50 percent of 1999 levels by 2005, with much of the increase from the oil sands.[30] Moreover, it seems that oil-sands cost

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28 For an analysis of Canada's position under the U.S. oil import controls, see Watkins (1987).

29 In 1990 and 1991, IEA members *voluntarily* took steps to restrain demand and draw down stocks.

30 The NEB foresees total Canadian oil production rising from 328,000 cubic metres per day (cm/d) — close to 2 million barrels per day b/d) — in 1999 to some 500 cm/d (3,150 million b/d) by around 2005. An estimated 190,000 cm/d (1.2 million b/d) of production from new synthetic...

per barrel will not increase appreciably,[31] although environmental controls could add expense. The key to sustaining or increasing Canadian oil production over the long term will be the oil-sands bounty.

Additional pipeline capacity will be needed to handle any increased volume. As already mentioned, Enbridge plans to increase capacity. Express, the line running south from Alberta, is proposing to serve new markets in Kansas and Montana and intends to increase capacity. But more capacity expansions will be needed.

The preferred markets for additional output of synthetic crude-oil and bitumen blends will be Ontario and the United States. Ontario refineries now have ready access to imported oil; increased absorption of Canadian oil would require displacement of overseas imports. The U.S. market, with declining indigenous supplies, will beckon. Primary market targets will be the Midwest and Rocky Mountain states. In those regions, Canadian imports would meet competition from indigenous U.S. and foreign crude-oil, especially from Mexico and Venezuela.

Finding a home for oil output will not be a *fait accompli*. Refining facilities need to match the slate of crude oils to be run. Refinery upgrades to handle synthetic oil and bitumen may be encouraged by opportunities to combine them with those satisfying more stringent environmental standards, enabling both new product specifications and changes in crude-oil slates to be met (NEB 2000, 76, 77). Overcoming marketing problems related to the oil sands may well entail wider price differentials between light and heavier crude oils.[32]

Large-scale development of the oil sands predicated on the availability of markets in the United States will be assisted by the climate of deregulation and the safeguard that the NAFTA provides. Further penetration by Canadian oil of U.S. markets would be another symptom of increasing market integration. However, Canada's implementation of the Kyoto Protocol could potentially jeopardize prospective oil-sands projects, depending on what measures are enacted.

Electricity

Trans-Border Flows

Table B-3 sets out electrical energy flows between Canada and the United States. Such commodity trade figures can reveal trends in interdependence between the two countries, but trade flows, in themselves, fail to indicate the degree of interdependence in electricity. As with natural gas, the location of receipt and delivery points is important in determining the value of electricity flows. And

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Note 30 - continued

...crude and bitumen projects would be on stream by 2010 if all mooted plans came to fruition (NEB 2000, 59). East coast conventional oil production is expected to reach 70,000 cm/d in 2010 and beyond (ibid, 47).

31 In economist's jargon, the oil-sands supply curve will be quite flat, rather than noticeably upward sloping.

32 The NEB believes that U.S. markets will be able to absorb additional oil-sands production (2000, 77).

timing is critical for trade in electricity because storage via hydroelectric reservoirs is at a premium.

The significance of the location and timing of flows is illustrated by the numbers in Table B-4, which describes electricity trade with the United States. For example, in 2001, Quebec was a very substantial net exporter, whereas British Columbia was a net importer. Yet in terms of value, Quebec's net gain exceeded that of B.C. by only a little more than 10 percent. The average prices of exports and of imports were close for Quebec, while B.C. sold at an average price that exceeded import costs by a factor of two. Be aware that the figures for 1999 are typical, whereas those for 2000 and 2001 exaggerate the value of arbitraging because they span the period of California's electricity woes. Nevertheless, the trend toward standardized tariffs and access conditions over the developing international networks points to the increasing importance of short-term electricity exchanges based on supply-demand balances in particular markets.

Institutional Factors

Electricity supply is determined by the combination of generation and transmission. Transmission is not simply via a pipeline from a supplier to a customer; rather, it is over a grid (network) that unites the output of various generation resources to meet energy demand while maintaining the system's physical properties in a stable balance.

The consolidation of North American transmission grids has proceeded under the impetus of restructuring in the United States. Responding to a mandate from Congress, the U.S. Federal Energy Regulatory Commission (FERC), in April 1996, issued Order 888, requiring owners of transmission lines to file open-access, non-discriminatory transmission tariffs. Transmission facilities would no longer be controlled by vertically integrated utilities but would be open to other generators and customers.

To achieve effective open access, the FERC championed the idea that grids should be run by independent system operators (ISOs). A number of ISO organizations have been approved, one example being the PJM Interconnection in the mid-Atlantic states. Also, to facilitate consolidation of transmission grids, the order established reciprocity: Canadian utilities, although not subject to FERC jurisdiction, would have to offer open access to their transmission systems in return for the access to U.S. systems needed for the delivery of export sales.

To further facilitate expanded grid operations, the FERC issued Order 2000, in December 1999, directing its efforts toward establishing regional transmission organizations (RTOs). An RTO is a larger grouping of transmission owners and users who combine facilities into a single operating entity. The FERC Order 2000 issued in December 1999 directed its efforts at consolidating various ISOs with a goal of creating just five RTOs — notionally in the Northeast, Southeast, Midwest, West, and Ercot (Texas). This concept has not been endorsed by all system operators; the likely result is that the number of RTOs will be increased.

Because of their reciprocity feature, RTOs are certain to attract some form of Canadian participation. For example, B.C. Hydro has been actively involved in the development of RTO-West. Although not as encompassing as the FERC originally

envisaged (California is not likely to be receptive in the near future), this grid will cover states in the U.S. northwest plus Alberta and British Columbia. In September 2001, Manitoba Hydro signed a coordination agreement with the Midwest Independent System Operator (MISO), which is currently the lead organization for the formation of an RTO in the U.S. midwest. Quebec exports flow to New York and the New England states and will feed into whatever configuration the northeast RTO ultimately assumes. Ontario is in the forefront of reciprocity, since it allows U.S. generators to bid into its exchange. The Alberta Power Pool also allows participation by U.S. entities, although the transmission links are via Saskatchewan and B.C., which may limit the usefulness of that feature. In general, one can expect a strengthening of north-south trade patterns.

The momentum toward system integration continues. In April 2002, FERC issued a "notice of proposed ratemaking" with the objective of standardizing generator interconnection agreements. The final rules would further render seamless the several Canadian-U.S. regional markets. All generators in Canada and the United States would face the same access conditions to the grid. Most recently, FERC, in July 2002, issued a comprehensive order on "standard market design," addressing issues such as locational marginal pricing to manage congestion and a standardized tariff. This initiative has, however, provoked controversy with state regulators and regional system operators.

Canadian hydropower has played a significant backup role in North America, particularly during California's energy crisis.

Supply-demand balances in electricity markets served by several mostly interconnected grids govern the price of electricity that enters trans-border trade. This fact exerts pressure on Canadian governments and regulatory bodies to adjust wholesale and retail prices to market realties. However, since these markets have not, as a rule, been freed across international or provincial borders, the prices most Canadian consumers face are not market determined in a North American context. Suppliers in the United States are able to bid into the exchange pool, so an element of market determination is present, but it may be limited by inter-tie capacity.

Trade Balances

A large network affords several types of opportunity for economic gain. Canada is rich in hydroelectric generation, which has low operating costs and thus provides openings for continuing sales to distributors in areas that must rely on generation fired by more expensive fossil fuel. Hydro-Québec, with its own extensive hydro-electric generation and its long-term arrangements with Newfoundland, has been able to profit from exports to New England and New York.

Extensive electricity grids open the door to trade based on seasonal diversity. British Columbia affords an example. Electricity demand in B.C is higher in winter than in summer. The opposite is true in California, giving B.C. Hydro an export market for summer's surplus-generating capacity. Quebec's situation is similar because the summer peak in New York complements the winter peak at home.

Grids also combine with hydroelectric resources to yield another opportunity for gains from trade. Energy stored in high reservoir levels can be converted to electricity to meet the peaking demands of systems that rely primarily on generation fuelled by coal or natural gas. For example, Alberta relies chiefly on coal-fired plants. When provincial demand is low (late at night), B.C. can purchase

Alberta power relatively cheaply and maintain reservoir levels. During peak-use periods in Alberta or the United States, B.C. can profit by drawing down reservoirs and selling at the higher prices prevailing.

Table B-3 sets out the values of Canadian exports to and imports from the United States between 1991 and 2001. On balance, Canada has reaped net gains. In the five years, when the brunt of the California electricity market fiasco meant huge revenue for British Columbia, the net gains totalled nearly C$9 billion. Even if one excludes the exceptional years of 2000 and 2001, the average net gain for Canada has been about C$1 billion annually.

Canada's Strategic Position

Historically, geography has dictated north-south commodity trade flows between Canadian provinces and U.S. states. The nature of electricity grids reinforces this pattern. B.C. Hydro is connected to a grid that serves the U.S. Northwest and California and extends into Mexico. Manitoba Hydro is a member of the Mid-continent Area Power Pool. Ontario trades principally with New York, with transfers of energy from Manitoba being significant.

An electricity network is an entity that must be kept in balance at all times, and holding it so requires various backup and ancillary services. Canadian hydropower has played a significant backup role in North America. In particular, there were instances during California's travails when short-term infusion of electricity from B.C. averted widespread blackouts. Similarly, Quebec's resources are a potential backup for the U.S. northeast. To the extent that Canadian grids are integrated into north-south RTOs, network obligations in a crisis could be in potential conflict with domestic needs.

Prospects and Policies

The electricity trade is distinctive in the reality of physical interdependence. Participation in a network, as envisaged for RTOs, entails commitments for other services, such as having backup capacity, subscribing to *pro forma* tariffs, providing good access conditions and sharing responsibility for planning and financing system improvements. It also involves delegating responsibility for dispatching energy to an ISO.

The overall gains to participation in large regional RTOs are seen to be substantial. They include better utilization of generation capacity, deeper backup services, improved dispatch opportunities and more efficient transmission networks. Canadian strength, especially in hydropower, positions it to share in these gains.

The implications of the momentum toward system integration are far reaching and not yet fully appreciated. Provincial governments are under pressure to restructure their electricity markets in order to continue to participate in energy trading. In particular, there is a perceived need to split transmission ownership and operation from the traditional power monopolies, which are vertically integrated (generation, transmission, distribution). Alberta, Ontario and British Columbia are

in various stages of response. The removal of potential market power from transmission providers clears the way to restructuring the generation sector by opening the door to independent power producers and providing an opportunity for the possible extension of competition in industrial and retail markets.

The changing North American environment poses challenges for Canadian electricity regulation. Jurisdiction over generation, transmission and distribution is divided among federal, provincial and territorial governments. The boundaries are not always clear. The NEB must approve the construction and operation of international and designated interprovincial transmission lines. But in practice the provincial jurisdictions work out the interprovincial interconnections. (The word *designated* was apparently included in the's mandate to indicate that it is to apply to particular circumstances. In practice, we have not found an instance in which it has been used.)

The NEB has authority through its licensing procedure to regulate exports (but not imports) of energy, interruptible or firm, as well as contract duration. Currently, it limits export contracts to five years, viewing this maximum as discouraging the construction of generation capacity aimed at the export market (on the premise that investors would require longer-term contract commitments). The board has not shut the door on new export capacity, but it would look closely at any environmental impact. With export deals limited to the short term, if a domestic customer complains of being denied fair market access, remedy would be possible sooner than if the electricity were committed for a longer period. (Thus far, the NEB has not had to deal with this eventuality.)

The expansion of Canadian exports of oil and gas to the United States is more a tribute to deregulation than to free trade.

Provincial jurisdiction covers construction of facilities for generation, intra-provincial transmission and local distribution. Provinces can also exercise control over the export of electricity generated within the province. As a rule provincial boards regulate consumer prices, employing cost-of-service criteria.

The provinces thus govern the degree of market restructuring, if any. To date, Alberta and Ontario have moved most aggressively — for example, by establishing ISOs. British Columbia's recently announced energy plan follows this pattern. The FERC-led movement to free markets for North America challenges provincial and state governments. Market prices for electricity, governed by marginal cost, would require severe adjustment in most provinces, where the advantage of low-cost hydropower from existing infrastructure is either passed on to consumers or extracted by the provincial government. Market-based pricing of natural gas, a competitor of electricity in some applications, places pressure on governments to move electricity prices toward conformity with market dictates. A nascent question is whether U.S. interest groups would attack Canadian cost-based tariffs as a form of subsidy, under the NAFTA or otherwise. This approach would be precluded if, as in Ontario, commodity prices reflect an exchange pool.

Energy Trade: The Current Landscape

In this section of the *Commentary*, we highlight issues now surfacing in energy trade. In the next one, we suggest likely future developments.

It is tempting to say that the big expansion of exports of Canadian oil and natural gas to the United States over the past 15 years or so is a tribute to the free-

trade agreements. We believe it is more a tribute to mutual deregulation of these industries in the 1980s. The elimination of price controls and other autarkic measures has enabled north-south economic forces to be asserted more strongly. Certainly, the free trade agreements underpinned these developments. Moreover, the Canadian producing fraternity of companies and governments saw the agreements as insurance against any reversion to controls once surpluses had been absorbed. But the inspiration behind trade expansion remains the deregulated environment.

At present, the move toward greater reliance on market forces may be losing momentum. Conflicting interests have been intensified by several developments: the recent spike in natural-gas prices, a tightening of the world oil market and the gyrations of electricity prices in some U.S. states. Within this setting, we identify frictions that are surfacing in three areas.

Grappling with Deregulation

The move to unregulated markets in natural gas was, as noted, accomplished relatively smoothly, though not without pain to some Canadian consumers living within sight of gas wells, yet facing escalating bills. Any similar adjustment in the structure of the electricity market would result in significant redirection of the benefits associated with established Canadian hydro infrastructure. Specifically, low cost-based electricity rates have resulted from traditional rate-of-return regulation. Canadian consumers would not welcome relinquishing this largesse, which they would if market pricing prevailed. Options exist for channelling the benefits of the hydro endowment to them while accommodating movement toward market-determined prices. However, any forcing of price-capped sales to domestic markets may conflict with the spirit of the NAFTA, if not its interpretation. The current assumption is that price caps related to cost would be acceptable, provided they applied to broad customer classes and did not single out particular industries.

Canadian electricity providers have participated in FERC's thrust toward system integration by subscribing to reciprocity and tariff requirements. The gains from the electricity trade are too substantial to give up. The FERC initiatives currently entail standardized generator interconnection agreements and standard market design. These developments, if involving Canadian participation, offer opportunities for system economies over large regions. But such potential gains would come at the cost of a loss of independence for Canadian generators and transmission operators, as well as a loss of room for manoeuvre by Canadian governments and regulatory bodies. Critics argue that Canadian consumers are exposed to added risk, although the opposite point of view can be advanced.

The integration of North American energy markets has implications for Canadian policy traditionally imbued with the notion of the country's exporting only oil and gas surplus to its own requirements. These ramifications are perhaps only dimly perceived at present. Market-based procedures have not been properly tested where the clearance of natural-gas markets entails markedly higher Canadian prices. Nothing in the current regulations ensures Canadian buyers parity of access when short-term exports (the mode under which the majority of

exports take place) are up for grabs — a situation that may prove increasingly irksome. We suggest the regulations are not well aligned with legislation predicated on the notion of a determinate export surplus, a notion that, in turn, is not well aligned with policies and international trade agreements designed to implement market-clearing prices.

The Oil Sands, Coal, and the Environment

Sleeping giants sometimes awaken. An example is the Alberta oil sands, for which technology has lowered cost thresholds. Oil production from the sands is economic at the current price of crude oil, oil-sands exhaustion is not foreseen and the costs of additional recovery are not on an apparent upward track. Americans are not blind to the fact that the sands could assist in reducing dependence on overseas supplies of crude oil. Access to the oil sands is therefore a prize — a potential winner for the United States from continental energy integration. For Canada, this resource could propel any strategy to further liberalize trade to the country's benefit.

Access to the oil sands is a winner for the United States; it also gives Canada a powerful bargaining platform.

The situation is complicated because Canada's accession to the Kyoto Protocol places it at odds with the United States, which has spurned the agreement. Thus, there is an asymmetry across the border with ramifications that are speculative at this time. One possibility mooted is a reconfiguration of oil-sands activity by the location of some new bitumen-upgrading facilities south of the border.

Although we say little about coal in this paper, we would be derelict not to mention that it is another giant, currently suffocating under an environmental blanket. Technologies for reducing the pollution that accompanies the combustion of coal are familiar — with the exception of carbon dioxide removal — but the political will to mandate the higher costs seems lacking. Expanded use of coal in electricity generation is contingent on how environmental controls are applied to it and competing fuels. This situation could have an impact on Canadian gas exports, but the effect remains uncertain. Again, in light of the U.S.'s recent relaxation of emission standards for coal-fired plants, there is an asymmetry that could breed conflict.

Deeper Integration

The U.S. administration's policy, as laid out in the Cheney Report (May 2001), is a cheerleader for unified energy markets. The report expounds on the need for a North American energy framework to expand and accelerate cross-border investment in pipelines and electricity grids by streamlining the permit process with Canada and Mexico. Earlier, we alluded to the singling out of the prospective pipeline from Alaska to the lower 48 states as a candidate for expedited treatment. The Cheney Report also calls on the administration to develop closer energy integration among the NAFTA partners (2001, 8-9). The creation of the North American Energy Working Group in spring 2001 to enhance energy cooperation was one step along this road. The intention is for cooperation to include

development of new energy technologies as well as the full range of conventional energy activities (North American Energy Working Group 2002, ii).

We believe that there is more to achieving market integration than eliminating market barriers, outlawing discriminatory taxes and prohibiting price discrimination, as provided by the NAFTA. Fuller integration must also entail some degree of harmony in other regimes that govern resource exploitation. It does not seem consistent with market integration for one party to avoid any activity on selected tracts of prospective lands — the Alaskan National Wild Life Refuge, for example — while expecting its neighbour to go ahead with the development of similar regions. Conversely, pushing through the Alaska Highway natural-gas pipeline, in preference to a Mackenzie Delta route, would bypass potentially attractive natural gas in Canada unless a stand-alone Canadian line were economic. Interest in the latter is increasing, however, rendering concerns about potentially stranded Canadian supply moot.

Environmental issues are of growing concern. Canadians can be forgiven for feeling that the United States sees their country as a secure source of supply, in some instances expecting it to provide infrastructure and in others to absorb environmental costs. An example of the former view is the assumption that Canada will serve as a land bridge for Alaskan gas. The proposed electricity generator project at Sumas, Washington, illustrates both outlooks. The plant would be fuelled by Canadian natural gas, the electricity would be exported to Canada and then re-imported to the United States over Canadian facilities, and air pollution from the plant would spill into the Fraser Valley airshed in Canada. Projects such as these may have economic justification, but Canada needs institutional arrangements that permit both a sharing of economic benefits and mechanisms for minimizing environmental damage.

What Lies Ahead?

We believe that Canada-U.S. energy trade will not continue to evolve as it did over the last decade. Certain changes are coming into focus. We begin by suggesting reasons why energy issues will become more prominent. We then look at the outlook for growth in energy trade and the scope for further integration. Specifically, we do not foresee trade expanding at past rates, nor do we see that gains from further system integration will be easy to achieve. In both matters, electricity may be an exception. But overall, we expect that Canadian governments and regulatory bodies will face some difficult decisions and that the substance and spirit of the NAFTA will be tested.

A Higher Profile for Energy?

Over the past decade, energy issues sank below the policy horizon as deregulation evolved and competitive market forces took root. In the forthcoming decade, we expect energy to assume a much higher profile on the policy agenda. Why?

First, the period of adjustment to competitive markets, cushioned as it was by spare capacity, is over for oil and gas. This is not true for electricity, where further market adjustment will proceed, with or without the benefit of extra capacity. Thus, the impact of market responses to changing economic forces will become more visible.

Second, a legacy of the September 11 attacks has been enhancement of U.S. concerns about the security of energy supply, concerns adumbrated in the Cheney Report (May 2001). This has led, and may continue to lead, the United States to pursue more interventionist policies in energy — proposals to accelerate and direct access to Alaskan natural gas are one instance.

Third, consumers like market prices when they are falling or stable. But the outlook for natural gas and electricity seems to be one of rising prices as markets tighten. One result may be calls for re-introduction of government controls — *re-regulation* has already become a buzz word in some circles. Re-introduction of electricity price controls in Ontario is a pregnant example.

Energy Trade Growth: A Lower Trajectory?

We described earlier the especially strong growth of trade flows in natural gas and crude oil since 1991. In the case of natural gas, this rise reflected increases in existing pipeline capacity and construction of new lines, backed by ample supplies. Oil was somewhat different; there was little latent spare capacity to absorb, pipeline capacity saw some increase, but output expanded to a much lesser degree than that of natural gas. What benefited the oil trade was a reconfiguration of supply as earlier, more economic north-south patterns were restored and the Montreal pipeline was reversed.

Canadian natural-gas reserves-to-production ratios have converged with U.S. levels, a sign of market integration. No significant, new Canadian pipeline developments are on the books, save the possible Mackenzie Valley line. Production from traditional western Canada sources seems set to peak and then slowly decline, with new sources required to maintain aggregate output. Conventional crude-oil production from western Canada is also beginning to dwindle — any increase in aggregate oil output is contingent on further oil-sands development and on east coast supply. New oil-sands projects are potentially threatened by measures related to the Kyoto Protocol.

The upshot is that the next decade will not see a repetition of the burgeoning growth in oil and gas trade between Canada and the United States that characterized the past decade. It will be more a question of sustaining current levels, rather than one of adding appreciably to them.

Gains from Integration: Diminishing Returns?

We have seen that deregulation and liberalized trade policies have been accompanied by significant growth in the value of trade in energy. A requisite condition has been the expansion of transportation infrastructure, permitting gains from system integration. The most dramatic example has been the development of

the network of natural-gas pipelines and system interconnections. In conjunction with the introduction of new marketing tools, this augmentation has meant more efficient matching of North American supply with demand. New pipelines have also created access to supply from freshly exploited areas, such as offshore Newfoundland and northeastern British Columbia.

We reiterate our scepticism that volume gains and the impetus they have provided for market integration can continue to accrue at rates like those experienced of late. However, examples of further network expansion can still be found that would benefit trade in natural gas — we noted earlier how pipeline bottlenecks funnelled Californian problems back to British Columbia. But future potential gains may be compromised unless market economics and a cooperative spirit can prevail in situations such as developing access to Arctic natural gas.

The outlook for trade in electricity is different. Network development is far less advanced than that for oil and gas and there is consensus on the need for new transmission structures. Significant gains remain likely as grids become more consolidated over larger areas, facilitating more trading to capitalize on seasonal and hourly differences in demand peaks. But here again, gains will be compromised unless institutions emerge that are capable of cooperating effectively in planning system development.

Time will tell whether NAFTA is robust enough to ensure fair play for Canadian energy interests in the inevitable disputes with the United States.

NAFTA: A Rougher Road?

The fact that energy will probably assume a higher policy profile has a corollary: conflicts over further deregulation and trade policies are likely to increase. Electricity deregulation in Canada is barely beyond infancy, but household and industrial consumers have taken a strong stand — and been heard — in their reluctance to move toward deregulated prices. The situation is exacerbated because supply is becoming tight. Canadian governments and regulatory bodies face formidable challenges if the movement to free energy markets is to continue. Governments have to remain watchful for cases of market failure and distortions through the exercise of market power. A risk of failing to stay the course would sacrifice the basic proposition that market discipline encourages efficient distribution and prevents investment in energy projects that may be uneconomic.

The integration of oil and gas markets has led to the asymmetry of Canada as supplier and the United States as consumer, causing the interests of domestic producer and consumer groups to diverge, a situation that threatens to worsen if supply conditions tighten. Depending on one's perspective, the NAFTA is either the hero or the villain. Yet the fundamental culprit, if there is one, is deregulation itself, rather than the underpinning agreement.

A U.S. government that displays a tendency to be more interventionist, at the possible expense of market-determined investment or trade patterns, may provoke disputes for which the NAFTA should provide the process for resolution. Time will tell whether that agreement is robust enough to ensure fair play of Canadian interests versus those of the United States.

Final Thoughts

The movement toward market-based trade in energy between Canada and the United States is near fulfilment. Remaining steps toward freeing markets will be more contentious as consumers face higher commodity prices and perhaps sacrifice some direct sharing of the lower costs that are attributable to Canada's natural endowments. Beyond these redistributing effects, impetus toward achieving further gains from integration will challenge policymakers to develop institutions to promote efficient infrastructure investment and resolve environmental conflicts.

A higher place for energy security on the U.S. agenda provides a platform that could enable Canada to solicit favourable access to the U.S. market and fair sharing of the benefits and costs of further market integration. In this connection, we note that, although this *Commentary* has looked only at energy, the NAFTA embraces the entire spectrum of economic activities. If the United States becomes more assertive and the bilateral negotiation of disputes descends to the level of horse-trading among sectors, energy is one area in which Canada has a potent stable.

To revert to the question posed by the title to this paper: the energy border retains seams, as it will with sovereign nations, but the stitching is increasingly tight.

Appendix A: The Energy Provisions of the NAFTA

Quantitative Import and Export Restrictions

If the NAFTA parties so choose, they can administer a system of import and export licensing for energy and basic petrochemical goods. But if one of the three NAFTA countries restricts energy and basic petrochemical trade with non-NAFTA countries, the other two cannot be used as a conduit to circumvent the restriction. And when a NAFTA party intends to impose import restrictions on non-parties, it must consult with the other two members.

Governments can impose export restrictions on the grounds of (a) conservation of exhaustible resources; (b) supply shortages; (c) price stabilization, and (d) national security.[33] These provisos were fashioned on the General Agreement on Tariffs and Trade (GATT), although its definition of what constitutes a national security criterion is more lax than that of the NAFTA. Moreover, the latter's definition of "national security" differs between Canada and the United States and between Mexico and the other two parties (annex 607).

If one party restricts supplies for any of the first three reasons (conservation, supply shortages, or price stabilization), it must ensure that consumers in the other countries as a group are not denied access, on commercial terms, to a proportion of the total available supply. The proportion is a historical share based on the average

33 In addition, the provisions of the General Agreement on Tariffs and Trade, article XX, apply. For example, exports or imports may be restricted for protection of human, animal, or plant life or health, provided the conditions of article XX are met. The provisions of GATT article XIV would also apply.

of the 36-month period immediately prior to the imposition of the export restriction. This proportionality provision does not constitute a supply *obligation*. The government imposing a restriction is not required to export a specific quantity. It is obliged only not to deny commercial access by importers to levels less than the past 36-month average share. The importer is not guaranteed a set volume. Restrictions are neither to disrupt normal channels of supply nor to impose higher prices on exports via licence fees, taxation, or minimum prices.

Until a request is made to invoke the proportionality clause, its significance remains hazy.[34] But it binds Canada and the United States to allocations dictated by market-clearing prices, even when supply is restricted. Note that the proportionality provision refers to *government* actions to restrict exports. There is nothing to stop *markets* constraining exports. Canadians could outbid Americans even for the proportional share of supply.

National security is a possible justification for import or export restrictions, but the grounds for action to be taken are tightly specified.[35] They relate to emergencies in international relations, a party's essential security interests, or actions required under the U.N. charter.

The U.S.-Canada arrangements on supply restrictions can be viewed as reciprocal tradeoffs. Canada granted proportionality to assuage U.S. concerns arising from Canada's export restrictions in the regulated era of 1970-to-1985. The United States granted a narrow interpretation of national security to meet Canadian concerns about any revival of U.S. import constraints imposed under the guise of national security in the 1950s and 1960s.

Pricing Provisions

No minimum or maximum export or import prices can be imposed. Export taxes are prohibited. But the agreement allows commodity price differentials between domestic and export markets that arise indirectly from permissible government measures or from commercial practices. For example, a utility that differentiated between domestic and export customers by customer class on the basis of commercial market conditions would not contravene NAFTA.

Dispute Mechanisms

If two countries cannot bilaterally resolve a dispute about NAFTA energy provisions, the Free Trade Commission established under the agreement would

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34 Up to the time of writing (January 2003), no such request has emerged. The proportionality provisions are a more precise expression of GATT-related restraints on energy export restrictions. However, the NAFTA provisions apply only to trade between the U.S. and Canada — Mexico is exempt. And proportionality does not apply to restrictions imposed for health, environmental, or safety reasons.

35 Again, Mexico is exempt from these provisions and their narrow scope. Instead, what applies are broad provisions on national security (article 2102), which refer to the agreement not precluding any party taking actions deemed necessary to protect its "essential security interest."

enter the fray, offering a forum for negotiation. At this stage, the other country could become involved. Arbitration is an option.[36]

Government Procurement

NAFTA is intended to liberalize government procurement by providing non-discriminatory opportunities for suppliers from other signatory countries (see chapter 10). However, the agreement contains significant exceptions for procurement contracts that fall below threshold amounts listed by utilities and state or provincial governments and when small business set-asides apply.

Other Features

Energy regulatory measures within each signatory country must accord national treatment to imported goods. The general consultation provisions of the NAFTA are available if one party sees another's regulatory actions as discriminatory. And article 606(2) provides for energy regulatory bodies to "avoid disruption of contractual relationships to the maximum extent practicable."

Article 609 defines an *energy regulatory measure* as any measure by "federal or *subfederal* [emphasis added] entities that directly affects the transportation, transmission or distribution, purchase or sale, of an energy or basic petrochemical good." The clear intent is for provincial and state regulators to observe each party's NAFTA obligations.

The NAFTA reaffirms certain specific measures in the annexes to the FTA. They include the export of Alaskan oil to Canada (albeit in only limited volumes),[37] Canadian exemption from U.S. uranium enrichment regulations, U.S. exemption from Canadian uranium upgrading policies and the elimination of certain Canadian price tests on export of energy goods.

Article 608(1) of the NAFTA permits the parties to indulge in incentives for oil and gas exploration and development and related activities to "maintain the reserve base." And the agreement reaffirms the primacy of the International Energy Program for sharing oil supplies, at least between Canada and the United States,[38] in the event of an emergency.

Trans-border investment in energy between Canada and the United States is sizable. The investment chapter in the NAFTA (chapter 11) provides investor protection. It makes allowance for designation of monopolies and state enterprises,[39] but chapter 15 requires all parties to ensure that state enterprises accord non-discriminatory treatment in the sale of goods or services to investors of another party.

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36 Chapter 19 contains a dispute-settlement mechanism that may be used in anti-dumping and countervailing duty matters.

37 The lifting of restrictions on export of Alaskan oil by the United States has made this measure academic. It was, however, an odd asymmetry; there were no general restrictions on Canadian oil exports to the United States, but some restriction on export of U.S. oil to Canada.

38 Mexico is excluded because it is not a signatory to the IEP.

39 Such bodies are to act commercially in the purchase and sale of any monopoly good or service and are not to engage in anticompetitive practices in non-monopoly markets.

Chapter 15 also says that involvement by a state enterprise or monopoly in regulation elevates it to the level of the government, where it acquires the associated NAFTA government obligations.[40] Chapter 16 facilitates temporary entry for business and technical people; this can assist trade in energy services. Cross-border trade in energy services is also protected by national treatment and Most Favoured Nation (MFN) obligations (chapter 12).

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40 This could be especially relevant to activities by Mexico's national oil company, PEMEX.

Appendix B: Data

NOTE: All Dollar Amounts in These Tables are Canadian.

Table B-1: ***Natural Gas, Exports and Imports, Canada and the United States, 1991–2001***

	Exports to U.S.			Imports from U.S.			
	1 Quantity (BCF)	2 Value (MM of $)	3 Unit Value ($/MCF)	4 Quantity (BCF)	5 Value (MM of $)	6 Unit Value ($/MCF)	7 Trade Balance (MM of $)
1991	1,594	3,590	2.25	15	33	2.20	3,557
1992	2,008	4,730	2.36	68	150	2.21	4,580
1993	2,254	5,903	2.62	45	124	2.76	5,779
1994	2,565	6,428	2.51	53	176	3.32	6,252
1995	2,795	5,649	2.02	28	75	2.68	5,574
1996	2,829	7,433	2.63	52	189	3.63	7,244
1997	2,889	8,625	2.99	56	195	3.48	8,430
1998	3,149	8,967	2.85	40	132	3.30	8,835
1999	3,359	10,951	3.26	39	137	3.50	10,814
2000	3,575	20,554	5.75	73	398	5.45	20,156
2001	3,823	25,595	6.70	157	988	6.29	24,607

Sources: Column 1: CAPP communication, July 2002; Column 2: SC Energy in Canada 2000; Column 3: column 2 ÷ column 1; Column 4: EIA and SC Energy Handbook for exchange rate; Column 5: column 4 times column 6; Column 6: EIA; Column 7 : column 2 – column 5.

Table B-2: ***Crude Oil, Exports and Imports, Canada and the United States, 1991–2001***

	Exports to U.S.			Imports from U.S.			
	1 Quantity (MMbbl)	2 Value (MM $)	3 Unit Value ($/bbl)	4 Quantity (MMbbl)	5 Value (MM $)	6 Unit Value ($/bbl)	7 Trade Balance (MM of $)
1991	274	5,974	21.82	1.5	39	26.09	5,935
1992	302	6,639	22.01	1.9	35	18.42	6,604
1993	334	6,879	20.57	0.7	19	29.12	6,860
1994	358	7,197	20.09	2.3	62	27.54	7,135
1995	385	8,971	23.29	0.4	8	23.07	8,963
1996	405	10,495	25.92	9.1	230	25.31	10,265
1997	443	10,825	24.44	23.8	426	17.88	10,399
1998	482	8,670	17.97	33.4	950	28.42	7,720
1999	458	10,121	22.09	19.9	403	20.3	9,718
2000	505	19,307	38.20	8.6	261	30.48	19,046
2001	499	16,080	32.22	11.4	285	24.9	15,795

Sources: Columns 1 and 2: SC Energy Statistics Handbook; Column 3: column 2 ÷ column 1; Columns 4 and 5: SC Energy Statistics Handbook; Column 6: column 5÷ column 4; Column 7: column 2 – column 5.

Table B-3: ***Electricity, Exports and Imports, Canada and the United States, 1991–2001***

	Exports to U.S.			Imports from U.S.			
	1 Quantity (GWh)	2 Value (MM $)	3 Unit Value (cents/KWh)	4 Quantity (GWh)	5 Value (MM $)	6 Unit Value (cents/KWh)	7 Trade Balance (MM $)
1991	24,614	557	2.3	6,383	50	0.8	507
1992	31,549	714	2.3	6,476	76	1.2	638
1993	34,848	857	2.5	7,370	85	1.2	772
1994	51,012	1329	2.6	8,280	43	0.5	1,286
1995	43,321	1,186	2.7	7,428	75	1.0	1,111
1996	43,875	1,218	2.8	6,211	97	1.6	1,121
1997	45,267	1,377	3.0	9,374	214	2.3	1,163
1998	42,317	1,600	3.8	15,012	302	2.0	1,298
1999	42,915	1923	4.5	14,505	385	2.7	1,538
2000	49,774	4,059	8.2	13,713	621	4.5	3,438
2001	40,165	3,201	8.0	17,911	1,807	10.1	1,394

Source: Columns 1 and 4: EIA; Columns 2 and 5: SC Energy Statistics Handbook;
Column 3: column 2 / column 1; Column 6: column 5 ÷ column 4;
Column 7: column 2 – column 5.

Table B-4: ***Electricity Trading, Selected Provinces***

	Value			Average Price		Quantity		
	Exports	Imports	Gain	Exports	Imports	Exports	Imports	Net
	(MM $)			($/MWh)		(thousands of MWh)		
1999								
Quebec	712.4	101.4	611.1	35.33	33.06	16,560	2,453	14,107
B.C.	458.3	158.3	300.0	42.96	23.8	10,677	6,612	4,065
Ontario	172.6	71.4	101.2	60.9	44.36	2,753	1,610	1,143
2000								
Quebec	1067.4	125.4	942	46.56	31.71	20,233	3,953	16,280
B.C.	1986.6	336.4	1650.2	199.73	64.13	9,947	5,245	4,702
Ontario	287.9	103.4	184.5	56.93	55.04	4,324	1,879	2,445
2001								
Quebec	928.3	139.6	788.7	51.40	40.48	14,820	3,449	11,371
B.C.	2085.3	1382.2	703.1	341.75	171.89	6,102	8,041	–1,939
Ontario	201.8	201.6	0.2	55.33	71.03	3,375	2,838	537

Source: National Energy Board, "Electricity Exports and Imports."

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